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          **A Fire Retardant Floor Assembly**

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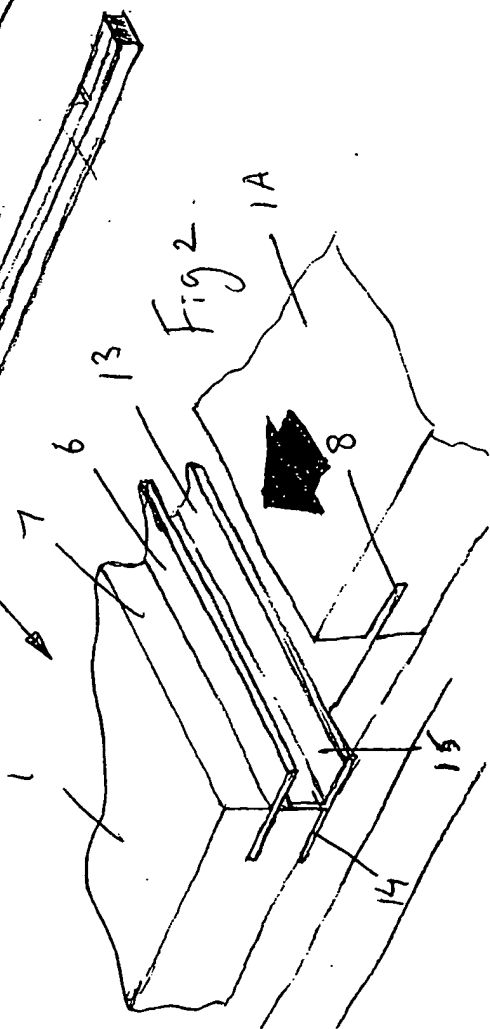
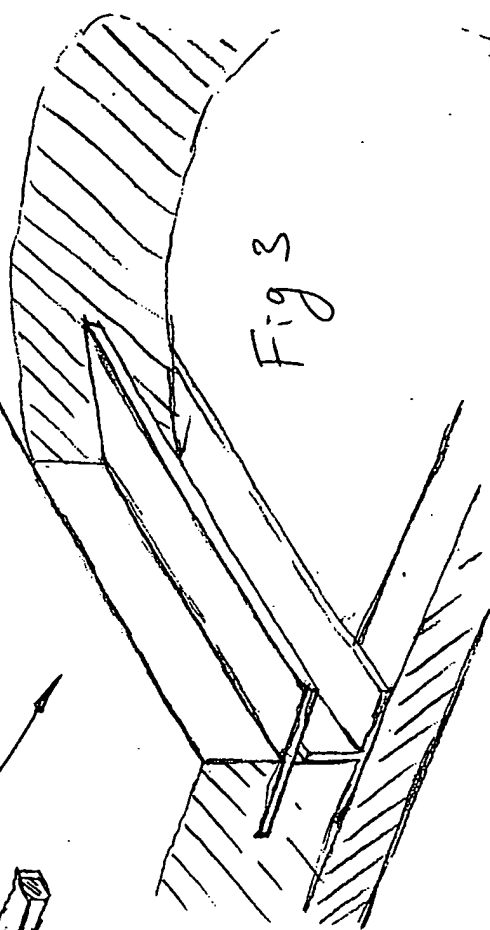
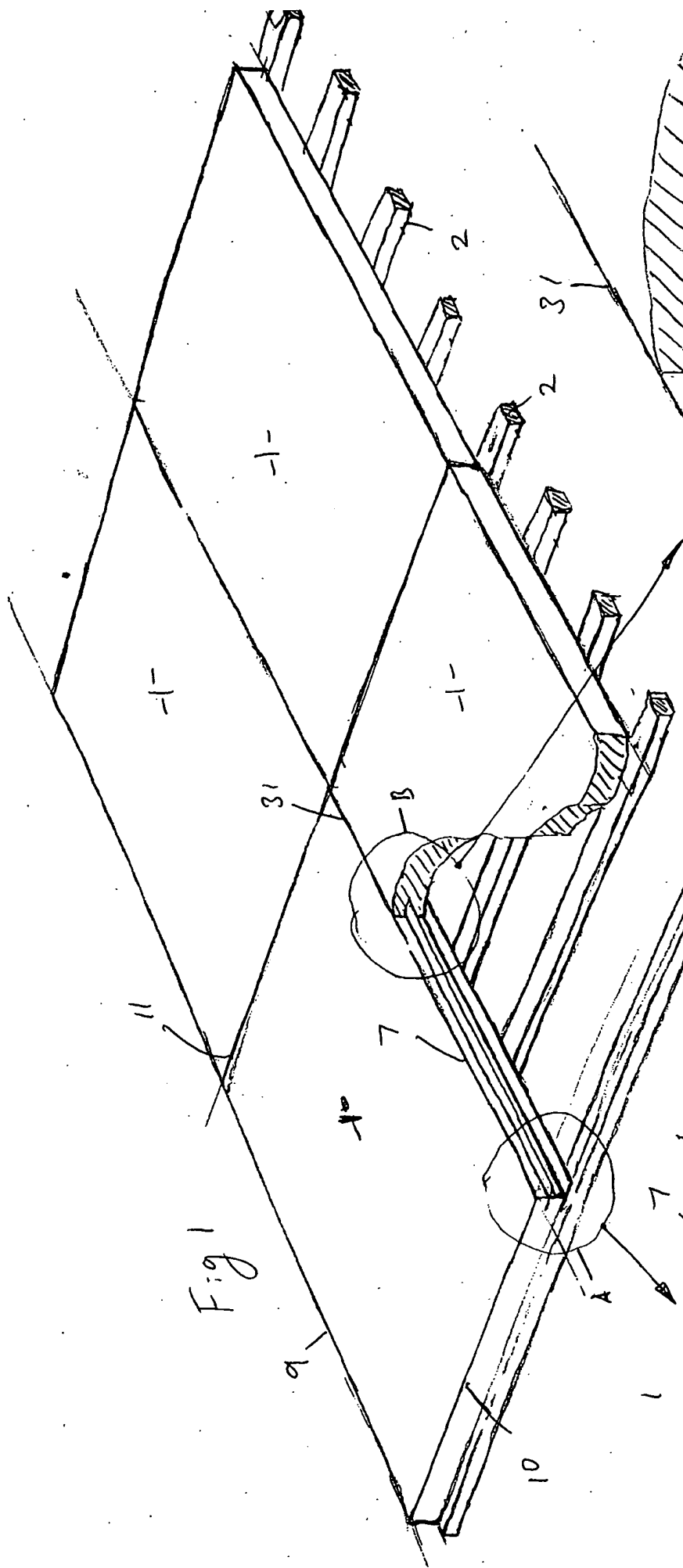
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# **ABSTRACT**

A floor assembly comprising a base structure including a plurality of parallel spaced apart joists, at least two juxtaposed quadrilateral shaped wood floor panels supported by the base structure and positioned in an edge to edge abutting relationship, wherein at least one pair of opposed edges of each panel, at least one of which is in the abutting relationship, spans at least one adjacent pair of joists, a capping means covering the edge to edge join of the abutting panels at the joist facing major surface sides of the abutting panels and extending at least between adjacent the joists.



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**COMPLETE SPECIFICATION**

**FOR A STANDARD PATENT**

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Invention Title:	A FIRE RETARDANT FLOOR ASSEMBLY

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The following statement is a full description of this invention, including the best method of performing it known to me.

## **FIELD OF THE INVENTION**

The present invention relates to a fire retardant floor assembly.

## **BACKGROUND**

Floor assemblies which may be used in buildings such as a warehouse or storage buildings, like many other aspects of the construction of the building must meet certain fire safety standards. In buildings where there are elevated floors to provide for example a mezzanine floor, it is not uncommon to use a structure consisting of a series of joists supported on bearers on top of which wooden floor panels are positioned. Certain fire safety regulations require such floors to contain a fire below and prevent it from spreading to above the floor for a specified minimum period of time. It is not just the exposure of the timber joist or bearers to fire which is one of the considerations in ensuring that safety standards are met, but also the exposed downwardly facing surfaces of the floor panel. The migration of fire from one side to the other of a floor panel will also affect the degree of safety provided by such to the building structure. One way of meeting such standards is to provide to the downwardly facing side of a flooring assembly (e.g. to the bearers or to the joists intermediate of the bearers), a cladding material such as ceiling panelling thereby preventing immediate and direct access of heat and flame to the joists and to the flooring panel. In such a configuration there are no downwardly presented parts of at least the joists and the floor panels exposed. The cladding may also enclose within the space between the floor panelling and such cladding, the bearers. However adding such additional cladding can lead to a significant increase in costs.

The subjecting of heat to a downwardly facing surface of a floor assembly which has an exposed edge of the surface facing downwardly, will result in the initiation of migration of flame or heat from the lower side to the upper side at the edge or abutting edges of floor panels. It is at such abutting edges of floor panels that the floor panels are most vulnerable to the progress of flame or heat. It is at such regions that smouldering of the floor material is most readily initiated.

Accordingly it is an object of the present invention to provide a fire retardant floor assembly which enhances the resistance to the migration of flames and/or heat from the lower side of the floor panelling to the upper side of the floor panelling or which will at least provide the public with a useful choice.

#### **BRIEF DESCRIPTION OF THE INVENTION**

Accordingly in a first aspect the present invention consists in a floor assembly comprising

a base structure including a plurality of parallel spaced apart joists

at least two juxtaposed quadrilateral shaped wood floor panels supported by said base structure and positioned in an edge to edge abutting relationship, wherein at least one pair of opposed edges of each panel, at least one of which is in said abutting relationship, spans at least one adjacent pair of joists

a capping means covering the edge to edge join of said abutting panels at the joist facing major surface sides of said abutting panels and extending at least between adjacent said joists.

Preferably said capping means covers the edge to edge join of said abutting panels at the joist facing major surface sides of said abutting panels.

Preferably said joists are timber joists.

Alternatively said joists are steel joists.

Preferably said joists are hi-hat type joists.

Preferably said capping means is an elongate constant cross section strip which is affixed to at least one of said two abutting panels, said strip being of a width to cover said edge to edge join.

Preferably said capping means includes a projection engaged between the edges of said edge to edge join of said abutting panels.

Preferably said protection is an elongate extension coextensive with said strip.

Preferably said capping means is an elongate constant cross section "T-shaped" member which is affixed to said two abutting panels, the cross bar portion

of said "T-shaped" member being of a width to cover said edge to edge join and placed abutting against the joist facing major surface of said abutting panels and the shank of said "T-shaped" member positioned intermediate of said abutting edges.

Preferably said capping means is made from a sheet metal.

Preferably said capping member is a thickness of 6mm or less.

Preferably said capping member is made from steel and is galvanised, zinc or zincaluminum coated.

Preferably said capping means is a nog placed to cover the edge to edge join between abutting panels intermediate of adjacent joists.

Preferably said panels each include an edge profile at, at least one opposed pair of edges, for tongue in groove abutting with adjacent panels.

Preferably each said panel has a first edge of a profile presenting a tongue midway between the major surfaces of said panel and a second edge opposite said first presenting a groove midway between major surface of said panel of a depth to receive a like tongue of and adjacent panel.

Preferably said at least two panels abut each other wherein said tongue in groove profiled edges extend transverse to the direction in which the joists extend.

Preferably said at least two panels abut each other wherein said tongue in groove profiled edges extend transverse to the direction in which the joists extend, said capping means positioned to cover the edge to edge abutting panels at the edges provided with said tongue in groove profile.

Preferably said joists are spaced apart such that the other of said opposed edge pairs to the edge pairs which included said tongue in groove profile are positioned on said joists.

Preferably said at least two panels abut each other wherein said tongue in groove profiled edges extend parallel to the direction in which the joists extend.

Preferably said at least two panels abut each other wherein said tongue in groove profiled edges extend parallel to the direction in which the joists extend, said capping means positioned to cover the edge to edge abutting panels at the opposed pair of edges other than those provided with said tongue in groove profile.

Preferably said joists are spaced apart such that the opposed edge pairs with said tongue in groove profile are positioned on said joists.

In a second aspect the present invention consists in a floor assembly comprising

a base structure including a plurality of parallel spaced apart joists

a first quadrilateral shaped wood floor panel supported by said base structure and

a second quadrilateral shaped wood floor panel supported by said base structure, said first and second panels positioned in an edge to edge abutting relationship, the abutting edges spanning at least one adjacent pair of joists

a capping means covering the edge to edge join of said abutting panels at the joist facing major surface sides of each said abutting panel.

Preferably said floor assembly is a loft or mezzanine floor assembly.

In a further aspect the present invention consists in a fire retardant mezzanine floor assembly which includes a plurality of spaced apart joists onto which there is positioned a tessellated quadrilateral shaped floor comprising of a plurality of panels positioned edge to edge, wherein the adjacent edges of said panels on the joist facing side and extending lateral to the direction of said joists are covered at least in part by a capping member.

In a further aspect the present invention consists in capping means for a floor assembly which comprises a base structure including a plurality of parallel spaced apart joists and at least two juxtaposed quadrilateral shaped wood floor panels supported by said base structure and positioned in an edge to edge abutting relationship, wherein at least one pair of opposed edges of each panel, at least one of which is in said abutting relationship, spans at least one adjacent pair of joists, said capping means to be provided covering the edge to edge join of said abutting panels at the joist facing major surface sides of said abutting panels and extending at least between adjacent said joists.

In still a further aspect the present invention consists in a **floor** supported on a floor support structure comprising

at least two juxtaposed quadrilateral shaped floor panels each supported by said floor support structure and positioned in an edge to edge juxtaposed relationship with one another,

a capping means covering the edge to edge interface of said juxtaposed panels at the floor structure facing major surface side of said juxtaposed panels.

In still a further aspect the present invention consists in a floor structure as herein before described and with reference to any one of more of the accompanying drawings.

In still a further aspect the present invention consists in a capping member as herein before described and with reference to any one of more of the accompanying drawings.

In still a further aspect the present invention consists in a capping member located to a floor structure as herein before described and with reference to any one of more of the accompanying drawings.

In still a further aspect the present invention consists in a floor structure as described with reference to any one of more of the accompanying drawings.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

A preferred form of the present invention will now be described with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a flooring assembly of the present invention illustrating a plurality of flooring panels supported on a series of spaced apart joists,

Figure 2 is a close up view of region A of Figure 1,

Figure 3 is a perspective close up view of region B of Figure 1,

Figure 4 is a perspective view of an alternative configuration of a flooring assembly of the present invention,

Figure 5 is a close up view of region C of Figure 4,

Figure 6 is a perspective view of the floor panelling of Figure 4 being manoeuvred into position,

Figure 7 is a cross-sectional view of a capping member of the present invention,

Figure 8 is a cross-sectional view of an alternative capping member of the present invention,

Figure 9 is a side view of an alternative joist configuration that may be utilised in the present invention,

Figure 10 illustrates an alternative form of capping of the exposed abutting edges of adjacent panels of the floor assembly of the present invention,

Figure 11 is a sectional view of two panels with an alternative form of capping member, and

Figure 12 is a sectional view of an alternative capping member.

#### **DETAILED DESCRIPTION OF THE INVENTION**

In Figure 1 there is illustrated a plurality of flooring panels 1 which are preferably of a quadrilateral plan shape and preferably of a rectangular quadrilateral plan shape. The panels are supported on a plurality of joists 2 which are each spaced apart from an adjacent joist and extend longitudinally and across bearers 3 as for example shown Figure 4. The floor panels 1 are preferably made from a fibre board or similar material which is of a sufficient thickness to provide support for the desired purpose. The floor panels 1 are preferably engaged against adjacent floor panels in an abutting relationship. In the abutting relationship the plurality of floor panels provide a floor of a desired size. The floor panels may also have some fire retardant material properties and may also include the provision of a tongue and groove edge profile. Such panels are available on the market and provide along a first of the longer edges of the panel, a tongue (which may be of a plastic lip) which is inserted into a groove provided at that edge of the panel. At an edge of the panel opposite to the edge where the tongue is provided, there is provided a groove for receiving a tongue of an edge of a like panel to be placed adjacent. Adhesive may be utilised for establishing an abutting relationship between adjacent panels and where such panels are provided with a tongue and groove relationship, such a joint

thereby established providing high resistance to sheer loading. As can be seen with reference to Figure 2, the tongue 6 is provided at a first major edge 7 of a panel 1, and an adjacent panel 1A provides a groove 8 into which the tongue 6 of panel 1 can be inserted. The panels being of a quadrilateral shape preferably provide their edges either parallel to and lateral to the direction of the joists. At least a first pair of opposed edges 7, 9 of a panel 1 extend across at least one pair of adjacent joists and preferably with reference to Figure 1, a plurality of adjacent pairs of joists. The minor edges 10, 11 of a panel 1 are preferably spaced apart so as to each locate on top of a respective joist 2. This is so since floor panels of a kind as previously described have no tongue and groove relationship provided on the minor sides of such panels, vertical support to relative sheer forces at joins of adjacent panels along their minor edges, is provided by their location on top of a joist 2. Such floor panels will extend between a centre line of a first joist to a centre line of another joist, the positioning on the centre line thereby allowing for room for an edge of an adjacent panel to also be supported on such joist.

In the assembly of a floor structure utilising such panelling, a first panel is normally placed on top of the joists and a second panel is subsequently slidingly moved in an edge to edge wise abutting relationship for engagement with the first placed panel. Prior to the engagement of a second panel with a first placed panel, a capping member 13 is placed in position relative to the first placed panel. The capping member 13 is positioned to locate a flange 14 thereof intermediate of the downwardly facing major surface of the panel 1 and the joist 2. The capping member also presents a flange 15. When the second panel 1A is engaged with the panel 1 as shown in Figure 2, the flange 15 also locates intermediate of the downwardly facing surface of the panel 1A and the joist at the join of the two panels 1, 1A.

When two adjacent floor panels are in an edge to edge abutting relationship the capping member presents the flanges 14 and 15 extending across the interface between the two abutting edges of the panels. As such the capping member conceals to the downward direction, the exposed edges of the adjacent panels where

the minor edges 10, 11 of the panels are supported on top of the joists. The use of the capping member 13 of the present invention, ensures no exposed edges of the flooring panels are presented downwardly and thereby conceal to the progress of flame and the resultant damage therefrom e.g. by smouldering, any such edges of panelling prone to such damage.

The capping member 13 is preferably of a T-shaped cross-section as for example shown in Figures 7 or 8. Figure 7 shows the capping member 13 folded from a sheet metal material. The capping member 13 is preferably of a T-shape and includes a shank portion 18 and the crossbar portion 19 which presents the flanges 14 and 15 for extension across the interface between the adjacent edges. In an alternative configuration the capping member may be made from an extruded material and may be of a configuration as shown in Figure 8. The wall thickness of the capping member should be sufficiently thin such that when insitue, it has little or no impact on the relationship between the panels and the joists or between adjacent panels at the abutting edges. The shank 18 is located between the abutting edges of adjacent panels as for example shown in Figures 2 and 3. The shank 18 aides in the capturing of the capping member with the panels to ensure that a close fit of the flanges 14 and 15 (in the vertical direction) occurs against the lower facing surfaces of the abutting panels. However alternative means of achieving the objective and ensuring sufficient affixing may be provided by for example a strip 29 along which a plurality of spaced apart mechanical fastening elements such as screws 30 are provided, screwing the strip 29 to the panels. Such screws may penetrate the floor at the panels at their interface 31 of adjacent panels 1, 1A as for example shown in Figure 10.

In an alternative configuration of the present invention the capping member may consist of nogs 32 provided positioned to extend between joists 2 at and corresponding to where the interface 31 of adjacent panels is provided. In the configuration as for example shown in Figure 3, the tongue and groove edges of the panels are positioned provided supported on top of the joists 2 and the non tongue and grooved edges 10, 11 are positioned extending laterally across the longitudinal

directions of the joists 2. Such non tongue and grooved edges 10, 11 are in the second form of the present invention covered from being exposed to the downwardly direction of the panels by nogs 32 which unlike the most preferred form of the capping member of Figure 7, extend between joists whereas the capping member of Figure 7 extends also across the joists. However the capping members of Figure 7 may also only be provided to extend intermediate of the joists and can be retrofitted especially for example in the configuration of Figure 10. The configuration of the capping members of Figure 7 are only able to be engaged intermediate of the panels during the construction of the floor assembly and cannot be retrofitted due to the fact that the panels are placed on top of part of the capping members to be positioned intermediate of the floor panels and the joist.

Figures 11 and 12 illustrate a one piece tongue/capping member configuration where the tongue and the T-bar extend from the same shank.

Whilst the floor panels are preferably of a wood based material such as an MDF, alternative material may also be included or used for defining a floor panel.

Where reference herein is made to an abutting relationship it is to be appreciated that such a relationship may include the provision of an intermediate element between the two edges of the panel. Such intermediate element may for example be the shank of the "T" shaped capping means.

## CLAIMS

1. A floor assembly comprising  
a base structure including a plurality of parallel spaced apart joists  
at least two juxtaposed quadrilateral shaped floor panels each supported by said base structure and positioned in an edge to edge juxtaposed relationship with one another, wherein at least one pair of opposed edges of each panel, at least one of which edge is in said juxtaposed relationship, spans at least one adjacent pair of joists  
a capping means covering the edge to edge interface of said juxtaposed panels at the joist facing major surface side of said juxtaposed panels and extending at least between adjacent said joists.
2. A floor assembly as claimed in claim 1 wherein said capping means covers the edge to edge interface of said juxtaposed panels at the joist facing major surface sides of said juxtaposed panels.
3. A floor assembly as claimed in claim 1 or 2 wherein said joists are timber joists.
4. A floor assembly as claimed in any one of claims 1 to 2 wherein said joists are steel joists.
5. A floor assembly as claimed in any one of claims 1 to 2 wherein said joists are hi-hat type joists.
6. A floor assembly as claimed in any one of claims 1 to 5 wherein said capping means is an elongate constant cross section strip affixed to at least one of said two juxtaposed panels, said strip being of a width to cover said edge to edge interface.
7. A floor assembly as claimed in any one of claims 1 to 6 wherein said capping means includes a projection engaged between the edges of said edge to edge interface of said juxtaposed panels.
8. A floor assembly as claimed in claim 7 wherein said protection is an elongate extension coextensive with said strip.
9. A floor assembly as claimed in any one of claims 1 to 8 wherein said capping means is an elongate constant cross section "T-shaped" member which is affixed to

said two juxtaposed panels, the cross bar portion of said "T-shaped" member being of a width to cover said edge to edge interface and placed abutting against the joist facing major surface of said juxtaposed panels and the shank of said "T-shaped" member positioned intermediate of said edge to edge interface.

10. A floor assembly as claimed in any one of claims 1 to 9 wherein said capping means is made from a sheet metal.
11. A floor assembly as claimed in any one of claims 1 to 10 wherein said capping member is a thickness of 6mm or less.
12. A floor assembly as claimed in any one of claims 1 to 11 wherein said capping member is made from steel and is galvanised, zinc or zincalume coated.
13. A floor assembly as claimed in claim 1 wherein said capping means is a nog placed to cover the edge to edge interface between juxtaposed panels intermediate of adjacent joists.
14. A floor assembly as claimed in any one of claims 1 to 13 wherein said panels each include an edge profile at, at least one opposed pair of edges, for tongue in groove abutting with adjacent like panels.
15. A floor assembly as claimed in any one of claims 1 to 13 wherein each said panel has a first edge of a profile presenting a tongue midway between the major surfaces of said panel and a second edge opposite said first presenting a groove midway between major surface of said panel of a depth to receive a like tongue of an adjacent panel.
16. A floor assembly as claimed in claim 15 wherein said at least two panels abut each other wherein said tongue in groove profiled edges extend transverse to the direction in which the joists extend.
17. A floor assembly as claimed in claim 15 wherein said at least two panels abut each other wherein said tongue in groove profiled edges extend transverse to the direction in which the joists extend, said capping means positioned to cover the edge to edge juxtaposed panels at the edges provided with said tongue in groove profile.

18. A floor assembly as claimed in claim 15 wherein said joists are spaced apart such that the other of said opposed edge pairs to the edge pairs which included said tongue in groove profile are positioned on said joists.
19. A floor assembly as claimed in claim 15 wherein said at least two panels abut each other wherein said tongue in groove profiled edges extend parallel to the direction in which the joists extend.
20. A floor assembly as claimed in claim 15 wherein said at least two panels abut each other wherein said tongue in groove profiled edges extend parallel to the direction in which the joists extend, said capping means positioned to cover the edge to edge abutting panels at the opposed pair of edges other than those provided with said tongue in groove profile.
21. A floor assembly as claimed in claim 15 wherein said joists are spaced apart such that the opposed edge pairs with said tongue in groove profile are positioned on and extend along said joists.
22. A floor assembly as claimed in any one of claims 1 to 21 wherein said edge to edge interface is an abutting interface.
23. **A floor assembly** comprising
  - a base structure including a plurality of parallel spaced apart joists
  - a first quadrilateral shaped wood floor panel supported by said base structure
  - and
  - a second quadrilateral shaped wood floor panel supported by said base structure, said first and second panels positioned in an edge to edge juxtaposed relationship, the juxtaposed edges spanning at least between one adjacent pair of joists
  - a capping means covering the edge to edge interface of said juxtaposed panels at the joist facing major surface side of each said panels.
24. A floor assembly as claimed in claim 23 wherein said floor assembly is a loft or mezzanine floor assembly.
25. **A fire retardant mezzanine floor assembly** which includes a plurality of spaced apart joists onto which there is positioned a tessellated quadrilateral shaped

floor substrate comprising of a plurality of panels positioned edge to edge, wherein the adjacent edges of said panels on the joist facing side of said floor substrate and extending lateral to the direction of said joists are covered at least in part by a capping member.

26. **A capping means** for a floor assembly which comprises a base structure including a plurality of parallel spaced apart joists and at least two juxtaposed quadrilateral shaped wood floor panels supported by said base structure and positioned in an edge to edge juxtaposed relationship, wherein at least one pair of opposed edges of each panel, at least one of which is in said juxtaposed relationship, spans at least one adjacent pair of joists, said capping means to be provided covering the edge to edge interface of said juxtaposed panels at the joist facing major surface sides of said juxtaposed panels and extending at least between adjacent said joists.

27. **A floor structure** as herein before described and with reference to any one of more of the accompanying drawings.

28. **A capping member** as herein before described and with reference to any one of more of the accompanying drawings.

29. **A capping member** located to a floor structure as herein before described and with reference to any one of more of the accompanying drawings.

30. **A floor structure** as described with reference to any one of more of the accompanying drawings.

31. **A floor assembly** comprising  
a base structure including a plurality of parallel spaced apart joists  
at least two juxtaposed quadrilateral shaped floor panels each supported by said base structure and positioned in an edge to edge juxtaposed relationship with one another, wherein at least one pair of opposed edges of each panel, at least one of which edge is in said juxtaposed relationship, spans at least one adjacent pair of joists

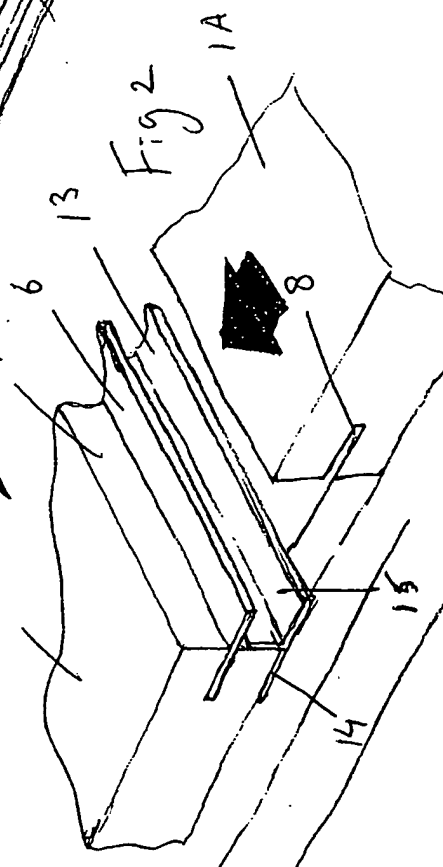
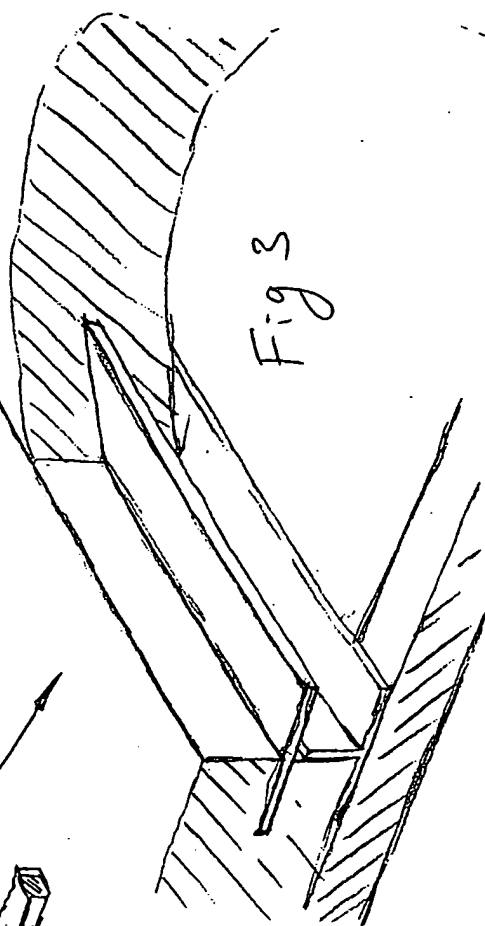
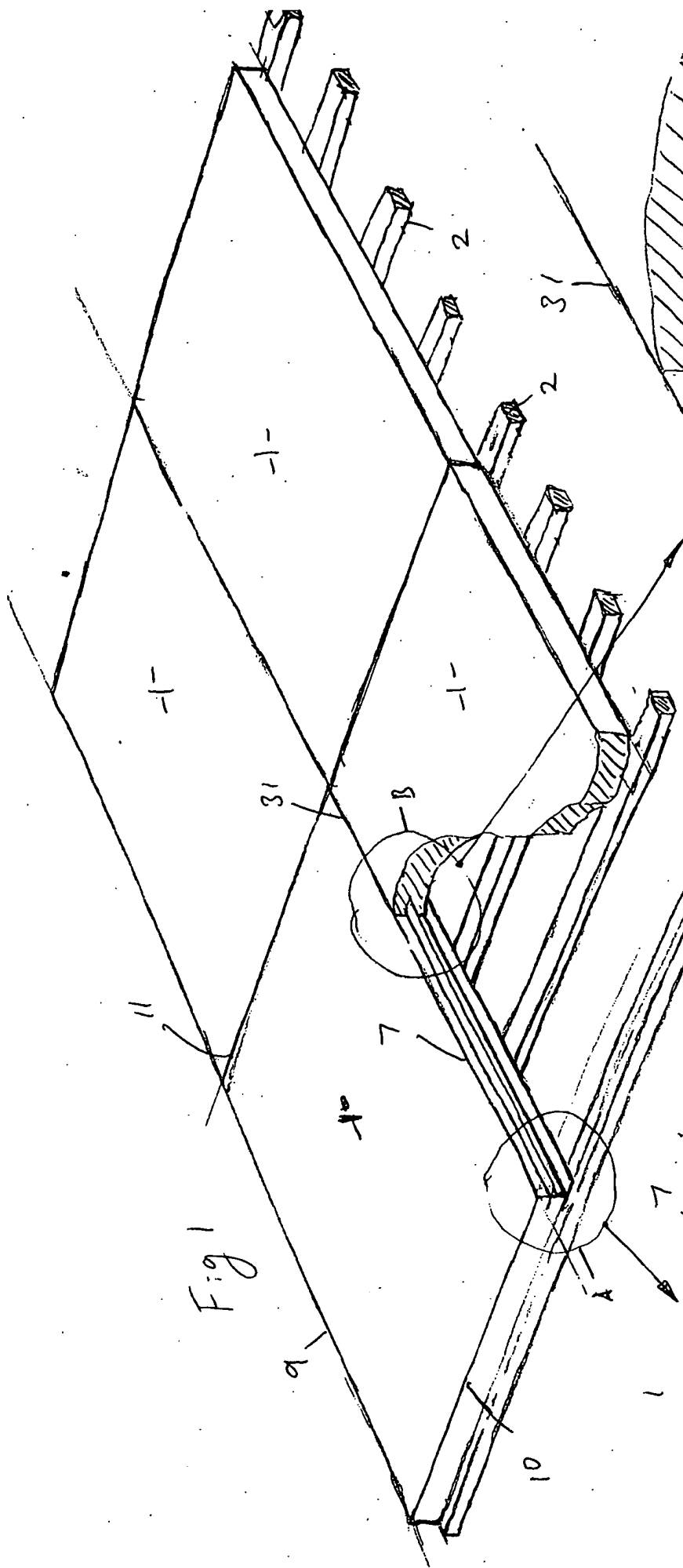
a capping means covering at least some of the edge to edge join of said abutting panel on the joist located major surfaces of said panels.

32. A floor assembly as claimed in claim 30 wherein said capping means is provided at the edge to edge join intermediate of said joists.

33. A floor assembly as claimed in claim 30 wherein said capping means is provided at all exposed downwardly facing edge to edge join regions.

34. A floor supported on a floor support structure comprising  
at least two juxtaposed quadrilateral shaped floor panels each supported by said floor support structure and positioned in an edge to edge juxtaposed relationship with one another,

a capping means covering the edge to edge interface of said juxtaposed panels at the floor structure facing major surface side of said juxtaposed panels.



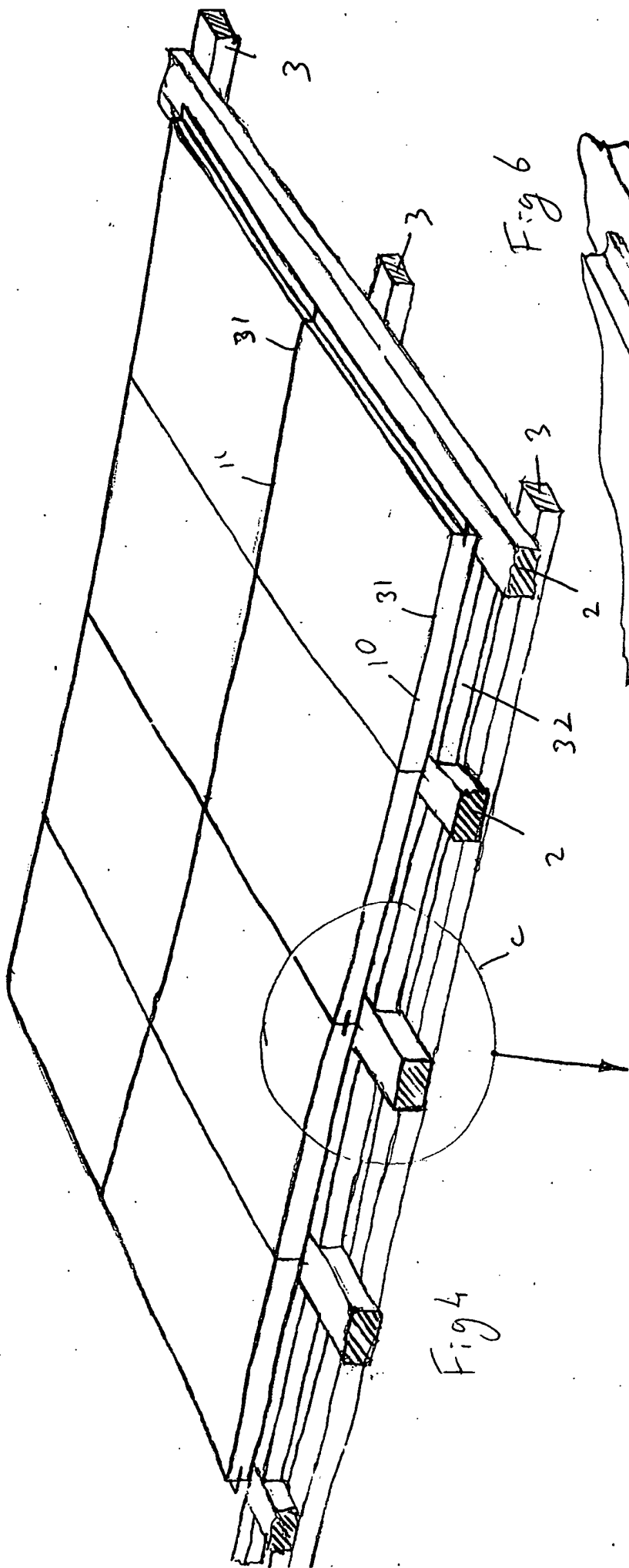


Fig 6

